APPENDIX A

System Specifications

This appendix contains system specifications.

General

This section provides general system information on the IGX 8.

System Capacity:	1 shelf with 8 card slots. Requires 2 dedicated front slot(s) for NPMs. Requires 2 dedicated back slots for SCMs (1 slot with blank plate). Up to 6 T1/E1 circuit ports. Up to 6 T1/E1 packet trunks. Up to 48 synchronous data ports. Up to 25 Voice, Data, and/or Frame Relay Module groups.
Enclosure Size:	IGX 8 Standalone/Rackmount: Height: 25 ins. (63.5 cm) standalone; 24.5 ins. (62.3 cm), rack Width: 19.9 ins. (50.5 cm), standalone; 19 ins. (48.3 cm.), rack Depth: 26.5 ins. (67.3 cm), standalone and rack-mount
Shipping Weight:	270 pounds (122.7 kilograms)
Clearance Requirement:	Min. clearance: 30 inches front; nominal 30 ins. rear; 12 ins. side.
Power Input Voltage:	AC system: 100 to 240 VAC (90–264 under-voltage and over-voltage tolerance), 47 to 63 Hz. DC system: –42 to –56 VDC. Each AC supply can provide up to 400 watts to the card shelves. Space for 4 power supplies.
Current Requirements:	Configuration dependent - use Network Design Tool for exact requirements. For planning purposes, use the following:
• AC System	10 Amps Max. for 110 VAC, 5 A for 220 VAC.
• DC System	20 Amps max. at –48 VDC; 25 Amps at –42 VDC (worst case)

Input AC Power Connector:	IEC 16 Amp input connector. 6 different power cords are available to comply with the standards of individual countries. Power cords are 6 feet (about 2 meters) long. See AC Power Cabling for details.
DC Input Connections	3-wire pluggable terminal block with screw terminal connectors.
Operating Environment:	0° to 50° C (32° to 104° F). Maximum 85% relative humidity
Shock:	Withstands 10 G, 10 ms. at 1/2 sine wave.
Vibration:	Withstands 1/4 G, 20–500 Hz.
Heat Transfer to Room:	IGX 8: 2720 BTUs max.

Voice Circuit Support

Voice Channel Interface:	24-channel T1 (D4 format). 24-channel T1-ESF (using CVM8). 30-channel framed CEPT E1. 31-channel framed CEPT E1.
Voice Compression Available:	32/24/16 Kbps ADPCM. 32 Kbps ADPCM. Voice Activity Detection compression.
Compression Algorithm:	ITU-T G.721, G.723, G.726. StrataCom 32 Kbps ADPCM.
PCM Encoding Types:	Accommodates μ-Law or A-Law encoding, End-to-end conversion available.
Channel Gain Control:	–8 dB to +6 dB.
Signalling Modes:	T1: Robbed bit or CCS (ISDN). E1: Channel Associative Signalling (CAS) or Common Channel Signalling (CCS).
Signalling Conditioning:	Various make-busy and forced idle routines during circuit alarm can be specified on a per-channel basis.
Quantizing Distortion Added:	2.5 Quantizing Distortion Units (QDU)s with 32 Kbps ADPCM over 1 hop plus 0.7 QDUs with Digital Loss PAD (μ-law or A-Law).

Data Channel Support

Sync. Data Interfaces:	RS-232C/D, RS-449/422, V.24, X.21, and V.35 with IGX 8 as DCE or DTE.
High-Speed Data Rates (HDM):	2.4 Kbps to 1.344 Mbps.
Low-Speed Data Rates:	2.4 to 19.2 Kbps per LDM port.
Ports per card:	LDI: 4 or 8. SDI: 4.
Control Leads Supported:	SDI: Per interface standards. SDI: Up to 7 in each direction for fast EIA. LDI: 3 in each direction for DCE and DTE for each port.
Control Lead Sync w/Data:	Control leads are sampled every 50 ms. and changes will normally follow data within 100 to 1000 msec. Fast EIA lead will be within 1 byte.
DS0A Interface:	Superrate, 56 Kbps to 512 Kbps (8 DS0s) per port. Subrate: One 2.4/4.8/9.6/19.2/ or 56 Kbps per DS0 Per Bell TR-TSY-000458, TR-TSY-000280, TR-TSY-000083, and TR-TSY-000077.
Data Clocking:	Synchronous and isochronous clocking. Normal, looped, and split clock configurations.
Pleisochronous Clock Range:	± 2 percent of nominal data rate.

Digital Data Service Interface

Ports per card:	Four.
Electrical Interface:	Digital Data System (DDS)—AT&T Pub. 62310, November 1987.
Interface Type:	DSU or OCU (software selectable).
Data Rates:	2.4, 4.8, 9.6, 19.2, and 56 Kbps (software selectable).
DDS Data Encoding:	Standard DDS Bipolar Return to Zero. Alternate Mark Inversion coding with bipolar violation sequences for zero suppression and control.
Data Compression:	Repetitive Pattern Suppression (RPS): 7, 8, or 16 bit pattern matching.
Synchronization Modes:	External (DSU only) Looped (OCU only).
Control Codes Recognized:	Idle. Zero Suppression. Out-of Service. Loopback Sequences.
Control Code Translation:	Translation of RTS to IDLE.
Alarm Code Translation:	Translation of the logical NOR of Out-of-Service Sync Fail. Excessive Bipolar Violations. No Signal to DSR (DSU only). No Signal to DTR (OCU only).
Connector:	ISO 4903, female DB-15 type connector.

T1 Interface

Line Rate:	1.544 Mbps, ± 50 bps (± 200 bps VCO lock range).
Line Code:	Bipolar AMI or B8ZS.
Framing Formats:	Fractional T1, adjacent or alternating channels. Minimum of four DS0 channels required.
Signal Level:	DSX-1 compatible.
Line Impedance:	Terminated = 100 Ohms nominal. Bridged = 1 KOhm.
Pulse Amplitude	Individual pulse amplitude 2.4 V–3.6 V (making a total base-to-peak amplitude of 6 V ± .6V)
Minimum Pulse Density:	Zero code suppression, either LSB or MSB.
Frame Format:	D4 and Extended Superframe (ESF).
VF Signalling:	Robbed bit D4 with A and B bits.
Max. Line Lengths:	Up to 533 feet with equalizers using ABAM cable.
Jitter Transfer:	Meets AT&T PUB 62411 specifications.
Jitter Tolerance:	Meets ANSI standards and AT&T PUB 62411 specs.
Connector:	DB 15 female.

E1 Interface

Line Rate:	2.048 Mbps, ± 50 bps (± 200 bps VCO lock range)
Line Code:	Bipolar AMI or HDB3
Line Impedance:	120 Ohms (balanced) or 75 Ohms (balanced or unbalanced)
Minimum Pulse Density:	Zero code suppression via HDB3 coding
Frame Format:	Unframed, 32-channel (G.703). Framed: 30 or 31-channel CEPT multiframe per ITU-T G.704.
VF Signalling:	CAS or CCS
Max. Line Lengths:	E1 output complies with G.703, so cabling must not exceed –6dB/1000 feet at 1024 kHz (applies to 75 Ohm coax or 120 Ohm twisted pair up to 350 meters or 1000 feet). StrataCom supplies cable with a maximum attenuation of 7 dB /1000 ft., so the maximum length of this cable is 850 feet (260 meters).
Jitter:	Meets G.823.
Electrical Interface:	Complies with G.703 Specification.
Connector:	DB 15 female or BNC.

T3 Interface

Line Rate:	44.736 Mbps ± 20 ppm, asynchronous.
Line Code:	B3ZS.
Clock Source Mode:	Internal (Asynchronous).
Signal Level:	DSX-3.
Framing Formats:	M13 mode, C-bit parity.
Alarms Processed:	AIS. LOS. Remote Alarm Indication. Loss Of Framing.
Line Errors Counted:	BPV. Parity Bit Errors.
Receiver Input Impedance:	Terminated = 75 ohms.
Transmission Modes:	Point-to-Point or Drop and Insert.
Jitter:	Meets ACCUNET T45 specification (Pub 54014).
Connector:	75 ohm BNC.
Max. Line Lengths:	450 ft. (137 m.) to DSX-3 using 75 Ohm coaxial cable.
Indicators:	RED Alarm. YELLOW Alarm. LOS. AIS.

E3 Interface

Line Rate:	34.368 Mbps ± 20 ppm, asynchronous.
Line Code:	HDB3.
Clock Source Mode:	Internal (Asynchronous).
Signal Level:	ITU-T G.703
Framing Formats:	ITU-T G.804, G.832,
Alarms Processed:	AIS. LOS. Remote Alarm Indication. Loss Of Framing.
Line Errors Counted:	BPV. Parity Bit Errors.
Receiver Input Impedance:	75 ohms unbalanced.
Transmission Modes:	Point-to-Point or Drop and Insert.
Jitter:	per ITU-T G.823.
Connector:	75 ohm BNC.
Max. Line Lengths:	137 meters (450 ft.) using specified cable.
Indicators:	RED Alarm. YELLOW Alarm. LOS. AIS.

Frame Relay Interface

Type of Service:	Permanent Virtual Circuit (PVC).
Data Interface:	Per ITU-T I.122 and ANSI T1/S1 Standards.
Data Transfer Protocol:	LAP-D frame level core functions.
Input Data Format:	High Level Data Link (HDLC) protocol.
Input Data Frame Length:	Up to 4096 bytes max.
Frame Integrity Check:	Frame Check Sequence and CRC check of data frame. If CRC fails, data frame is discarded at receiving node.
Input Data Rate:	56 Kbps to 2.048 Mbps. (Max. rate available only with one of four ports/card active).
No. of Ports per Card:	4
No. of PVCs per Port:	252 per FR card, distributed in any combination.
Port Electrical Interface:	ITU-T V.35. IGX 8 can act as a DCE or DTE for direction of control leads and timing.
Data Clocking:	Normal or looped.
Virtual Circuit Identifier:	Data Link Connection Identifier (DLCI).
Control Protocol:	Local Management Interface with XON/XOFF type flow control. IGX sets FECN and BECN bits in frame relay frame.
Bundled Connections:	252 virtual circuits per card 1024 virtual circuits per node.
Billing Time Accuracy:	Upon request from user device, IGX will provide GMT from any node accurate to within 1 second.

ATM Interface

Type of Service:	Permanent Virtual Circuit (PVC)
Interface Types:	User-to-Network (UNI) and Network-to-Network (NNI) per ITU I.361 and I.363
Data Rates:	T3 or E3
ATM Layer:	Physical Layer Convergence Protocol per AT&T publication TA-TSY-00772 and 000773 for T3; ITU I-361 with HEC for E3
Cell Rate:	96,000 cells/sec. for T3, 80,000 cells/sec. for E3
Adaptation Layer:	AAL5
No. of Ports per card:	4
No. of PVCs per card:	255
VPI Addressing Range:	0–255
VCI Addressing Range:	0–65535
Traffic Queues:	CBR, VBR, and ABR
Management Protocol:	Interim Layer Management Interface (ILMI)

Network Synchronization

External Clock Sources:	The IGX switch synchronizes to the nearest, highest-stratm clock available. Any T1, E1, T3, E3, OC3 (STM-1) line, trunk, or optional external clock inputs can serve a clock source.
Internal to Node Source:	T1: 1.544 MHz, ± 10 ppm (stratm 4) E1: 2.048 MHz, ± 10 ppm (stratm 4)
Clocking Hierarchy:	Dynamic primary, secondary, and tertiary clocking Without a defined external clock reference, the IGX defaults to its internal clock source.

Network Management Control

Network Control Terminal:	StrataView Plus workstation and StrataCom software required for graphical display of network status, statistics gathering and display, and automatic downloading of software.
Control Terminal:	DEC VT100, WYSE 85, Televideo 970 or equivalent terminal for basic system configuring and alarm monitoring.
Remote Alarm Reporting:	Auto-dial modem connects to one of two control ports on each IGX 8 node for automatic reporting of network alarms.
Remote Diagnostics:	Auto-answer modem connects to one of two control ports on each IGX node for remote diagnostic access by StrataCom ISC or other authorized personnel.
Network Control Ports:	Two ports per node, (one RS 232C interface and one Ethernet LAN port).
Alarm Notification:	Status of all trunks and nodes in network distributed to and stored by each individual node. Reported to StrataView Plus workstation at connecting node.
External Alarms:	Meets Bellcore Compatibility Bulletin #143 and AT&T Technical Reference PUB 43801 DS1 (T1) facility alarm requirements when equipped with DTI group.
Indicators and Controls:	Active and Fail lights on all cards and power supplies.